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Current Trends

Update: Serologic Testing for Antibody to Human Immunodeficiency Virus

Tests to detect antibody to human immunodeficiency virus (HIV), the virus that causes acquired immunodeficiency syndrome (AIDS), were first licensed by the Food and Drug Administration (FDA) in 1985, primarily as screening tests for blood and plasma donation. Since that time, millions of HIV antibody tests have been performed in laboratories of blood and plasma collection centers, in counseling and testing centers, and in clinical facilities as well as for purposes such as screening active duty military personnel and applicants for military service. Assuring accurate test results requires continued attention to both the intrinsic quality of the tests and the performance of the technical personnel doing the tests.

Given the medical and social significance of a positive test for HIV antibody, test results must be accurate, and interpretations of the results must be correct. For these reasons, the Public Health Service has emphasized that an individual be considered to have serologic evidence of HIV infection only after an enzyme immunoassay (EIA) screening test is repeatedly reactive* and another test such as Western blot (WB) or immunofluorescence assay has been performed to validate the results (*1*).†

*The terms "reactive" or "nonreactive" are used to describe serum or plasma specimens that give reactive or nonreactive test results and to describe the test results from EIA or WB tests before final interpretation. The terms "positive" and "negative" are used to describe the interpretation of EIA test results indicating that the specimen tested is 1) repeatedly reactive (positive) or 2) nonreactive or not repeatedly reactive (negative). The terms "positive," "indeterminate," and "negative" are used to describe the interpretation of WB test results that indicate that the specimen tested is reactive with a specific pattern of bands (positive), reactive with a nonspecific pattern of bands (indeterminate), or nonreactive (negative).

†Blood and plasma are not accepted for transfusion or further manufacture when the EIA screening test is positive, regardless of the results of other tests that may be performed.

A notice regarding changes in telephone numbers throughout the Centers for Disease Control and the Agency for Toxic Substances and Disease Registry appears on page 852.

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES / PUBLIC HEALTH SERVICE

Serologic Testing — Continued

Licensed test kits currently available in the United States for HIV antibody testing comprise seven EIAs and one WB. All of these tests use HIV antigens derived from disruption of whole virus cultured in human-derived cell lines. In addition, many laboratories produce their own WB test reagents using viral antigen purchased from commercial sources. A variety of other test procedures are in use or under development or are being evaluated for licensure.

Criteria for interpretation of a reactive anti-HIV EIA test are based on data from clinical studies performed under the auspices of each manufacturer. Since licensure of the first EIA test kits in 1985, the manufacturers have worked to improve the sensitivity, specificity, and reproducibility of their assays.[5] Clinical data submitted by the manufacturers to FDA for licensure indicate that the sensitivity and specificity of the EIA tests currently marketed in the United States are >99.0%. Other laboratories performing comparative analyses of licensed anti-HIV EIA test kits have found similar or slightly lower sensitivity and specificity (*2-5*). In routine use, both the sensitivity and specificity of the tests depend on the quality of testing in the laboratory. In addition, false-positive test results are observed when nonspecific serologic reactions occur among uninfected persons who have immunologic disturbances or who have had multiple transfusions. False-negative test results are observed among persons who have recently become infected with HIV and who have not yet developed detectable antibody (*6*).

Repeating each initially reactive EIA test increases the specificity of the test sequence by reducing the possibility that technical laboratory error caused the reactive result. In the American Red Cross Blood Services laboratories, a specificity of approximately 99.8% has been consistently achieved during screening of donated blood (*7*, unpublished data). However, in a population with a low prevalence of infection, even a specificity of 99.8% does not provide the desired predictive value[6] for a positive test. For this reason, it is particularly important not to rely solely on EIA testing to determine whether a person is infected with HIV. Rather, EIA test results should be validated with an independent supplemental test of high specificity conducted by a laboratory with high performance standards. In the United States, the validation test used most often is the WB. Some laboratories also use radioimmunoprecipitation assays and indirect immunofluorescence assays.

For the licensed WB test, interpretation of reactive and nonreactive tests is based on data from clinical studies submitted to FDA for licensure. The manufacturer states that, for a test to be considered positive with this WB, antibody must be reactive with multiple virus-specific protein bands, i.e., p24, p31, and either gp41 or gp160 (Table 1). If fewer bands are present, the test is considered indeterminate; it is interpreted as negative only if no bands are present on the blot. When the manufacturer's stringent criteria are used for interpreting test results, the probability of either a false-positive or a false-negative result is extremely small. In clinical trials for licensure of this WB, however, as many as 15% to 20% of tests on persons at low risk for HIV infection were described as indeterminate. Sera from persons recently infected with HIV also may produce an indeterminate WB pattern. For such

[5]Sensitivity is the probability that the test result will be reactive if the specimen is a true positive; specificity is the probability that the test result will be nonreactive if the specimen is a true negative; and reproducibility (reliability) is the ability to replicate qualitative results with the same or similar test procedures on blindly paired samples.

[6]The predictive value of a positive or negative test is the probability that the test result is correct.

Serologic Testing — Continued

persons, a repeat WB on a second specimen obtained after the initial specimen often yields a positive blot pattern within 6 months. Conversely, follow-up testing of uninfected persons whose serum had an indeterminate blot pattern on initial testing usually will show no change in the banding pattern. Serum from some HIV-infected persons who have advanced immunodeficiency may have an indeterminate pattern because of a loss of antibodies to non-*env* proteins (*8*). To reinstate donors with a history of a positive EIA test, blood and plasma centers may use only results from the licensed WB test performed in the FDA-approved test sequence.

The performance characteristics of the unlicensed tests used by many laboratories, whether WB, immunofluorescence assays, or other procedures, have not been uniformly subjected to the same rigorous scrutiny required for licensure by FDA. Recommendations for standardization have been published (*9*), but the extent to which these are followed is unknown. Information about production standards, inter-lot variability, or validation of criteria used for interpretation often is not available. Absence of standardization and appropriate quality controls may result in a lower sensitivity or specificity and, thus, a higher probability of inaccurate results (*10*).

Despite the existence of a licensed WB test, many laboratories continue to use unlicensed WB tests because of cost and the stringent criteria required for interpreting the licensed test. The potential problems in using and interpreting unlicensed WB tests have been openly debated (*11,12*). Although unlicensed WB tests can be highly accurate and reproducible when done with appropriate quality controls in laboratories with established performance standards (*9*), not all laboratories meet acceptable performance standards. Ten of 19 laboratories bidding for contracts to perform WB tests for the Department of Defense failed the required proficiency panel on one or more occasions (*13*). Two of the laboratories satisfying the performance standards were awarded contracts by the U.S. Army. Both of these laboratories use well-validated techniques for WB that yield virus-specific bands at p17, p24, p31, gp41, p53, p55, and p64. The U.S. Army considers these WBs to be positive if bands are present either at gp41 or at both p24 and p55 (*14*). In comparison with multiple

TABLE 1. Description of major gene products of human immunodeficiency virus (HIV)

Gene Product*	Description
p17	*gag*† protein
p24	*gag* protein
p31	Endonuclease component of *pol*§ translate
gp41	Transmembrane *env*¶ glycoprotein
p51	Reverse transcriptase component of *pol* translate
p55	Precursor of *gag* proteins
p66	Reverse transcriptase component of *pol* translate
gp120	Outer *env* glycoprotein
gp160	Precursor of *env* glycoprotein

*Number refers to molecular weight of the protein in kilodaltons; measurement of molecular weight may vary slightly in different laboratories.
†*gag* = core.
§*pol* = polymerase.
¶*env* = envelope.

Serologic Testing — Continued

validation procedures, WBs in these contract laboratories have an estimated specificity of 99.4%, and the laboratories have consistently performed accurately on all pre- and post-award quality assurance serum panels (*14*). These and other laboratories have demonstrated that the achievable false-positive rate of sequentially performed EIA and WB tests can be <0.001% (<1/100,000 persons tested) (*13,15*).

The College of American Pathologists (CAP), in conjunction with the American Association of Blood Banks, conducts an open proficiency testing program** for laboratories performing HIV antibody tests. Each quarter, more than 600 laboratories that participate voluntarily report results from testing five coded samples of plasma that have various known levels of anti-HIV reactivity or that are nonreactive.

In the CAP survey conducted in October 1987, the results of EIA tests at the participating laboratories correlated well with results from the referee laboratories (Table 2). For the three reactive samples (W-21, W-23, W-24), correlation ranged from 99.5% to 100%. For the single nonreactive sample that could be adequately evaluated (W-25), correlation was 98.3%. The nonreactive W-22 sample that was sent with the October 1987 serum panel had been prepared with a pool of processed plasma that caused an unexplained, nonspecific reaction with one of the EIA test kits. Consequently, the EIA results for this sample could not be evaluated.

The individual participating laboratories used their own criteria for interpreting WB results. WB results for two of the three reactive specimens were reported as indeterminate by one referee laboratory each, while results for the two nonreactive specimens in the CAP survey were reported correctly by all 10 referee laboratories (Table 3). One of the 73 participating laboratories reported a nonreactive sample (W-22, the sample that gave artifactual reactions with one of the EIA test kits) as reactive, while approximately 5% reported the two nonreactive samples as indeterminate, and 12% to 15% reported two of three reactive specimens as indeterminate.

For the three reactive samples, the results of 241 repeatedly reactive EIA tests could be compared with WB results (Table 4). For 215 (89.2%) of these, the WB tests

**The laboratories know that the samples have been supplied for proficiency testing.

TABLE 2. Comparison of responses by referee and participant laboratories on samples tested for anti-HIV by enzyme immunoassay (EIA), by sample number — College of American Pathologists Proficiency Testing, 1987

Sample Number	Reactivity	Percentage of Laboratories Reporting Correct Result	
		Referee Laboratory*	Participant Laboratory†
W-21	Reactive	100.0	99.8
W-22§	Nonreactive	80.0	51.4
W-23¶	Reactive	100.0	99.5
W-24¶	Reactive	100.0	100.0
W-25	Nonreactive	100.0	98.3

*Results reported by 15 laboratories selected because of extensive experience and excellent long-term performance in proficiency testing programs.
†Results reported by 601 other laboratories that voluntarily participated.
§Sample W-22 was prepared with a pool of processed plasma that caused an artifactual, nonspecific reaction with one EIA test kit.
¶Samples W-23 and W-24 were identical.

Serologic Testing — Continued

were reported as positive; for 23 (9.5%), the WBs were reported as indeterminate; and, for 3 (1.2%), they were reported as negative. Of 58 WB results performed on nonreactive samples found nonreactive by EIA, 55 (94.8%) were reported as negative by WB, and 3 (5.2%) were reported as indeterminate. None of the nonreactive samples were read as positive by WB.

Because criteria used to interpret WB varied by laboratory, banding patterns reported in the 299 WB tests conducted in the October 1987 survey were examined (Table 5). Two or more virus-specific protein bands were reported in 215 blots, 208 (96.7%) of which were interpreted as positive. Eighteen (60.0%) of 30 blots with only a single virus-specific protein band were considered positive. When the single protein band was from the *env* gene, 12 (85.7%) of 14 were read as positive. These data demonstrate that different laboratories may report different WB results for samples with the same banding patterns.

Results of CAP proficiency tests from more than 500 laboratories participating in the 1986 and 1987 surveys indicate the following performance for the anti-HIV EIA test. Of 6,946 tests on reactive samples, 99.5% were reported as positive. Of 1,142

TABLE 3. Comparison of responses on samples tested for anti-HIV by Western blot (WB) by referee and participant laboratories,* by sample number — College of American Pathologists Proficiency Testing, 1987

		Interpretation of WB Test Results (Percentage of Responses)					
		Positive Test		Indeterminate Test		Negative Test	
Sample Number	Reactivity	Referee Laboratory	Participant Laboratory	Referee Laboratory	Participant Laboratory	Referee Laboratory	Participant Laboratory
W-21	Reactive	100.0	100.0	0.0	0.0	0.0	0.0
W-22	Nonreactive	0.0	1.6	0.0	4.9	100.0	93.4
W-23	Reactive	90.0	80.8	10.0	15.1	0.0	4.1
W-24	Reactive	90.0	84.9	10.0	12.3	0.0	2.8
W-25	Nonreactive	0.0	0.0	0.0	5.6	100.0	94.4

*Results reported by the 10 referee and 73 participant laboratories that performed both EIA and WB tests.

TABLE 4. Relationship between results on samples tested for anti-HIV by enzyme immunoassay (EIA) and Western blot (WB), by sample number — College of American Pathologists Proficiency Testing, 1987

		Results by EIA*		Results by WB*		
Sample Number	Reactivity	Positive	Negative	Positive	Indeterminate	Negative
W-21	Reactive	76	0	76	0	0
W-23	Reactive	83	0	69	13	1
W-24	Reactive	82	0	70	10	2
W-25	Nonreactive	0	58	0	3†	55
Total		**241**	**58**	**215**	**26**	**58**

*Number of responses reported by both referee and participant laboratories. Sample W-22 was excluded because of an artifact of the sample.
†One sample by WB had only p24 bands reported; one sample had both p24 and p32 bands reported; and one sample had no bands reported.

Serologic Testing — Continued

tests on nonreactive samples, 98.3% were interpreted as negative. Based on results from 601 laboratories on a pair of identical reactive samples (W-23 and W-24), reproducibility was 99.5%.

For the WB test, calculations were based only on positive or negative results divided by the total number of tests in the October 1987 CAP survey (Table 4). For the reactive samples, 89.2% of 241 results were correctly interpreted as positive, and, for the nonreactive samples, 94.8% of 58 results were correctly interpreted as negative. Reproducibility, which was based on 83 tests on a pair of identical reactive samples (W-23 and W-24), was 95.2%. The performance of the referee laboratories was more accurate for the EIA and much more accurate for the WB than was the performance of the participating laboratories. The performance of the licensed and unlicensed WB tests could not be compared because the data were not collected.

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Editorial Note: Quality laboratory testing for HIV antibody is a critically important element for surveillance and detection of HIV infection. The laboratory testing process requires quality assurance for each step including: 1) collection, labeling, and transport of specimens; 2) laboratory reagents and procedures; 3) interpretation of analytical results; and 4) communication from the laboratory scientist to the clinician and then to the person being tested. Quality performance is promoted by using licensed or standardized tests in proper sequence and by developing consensus about interpretation of analytical results.

Proficiency testing benefits participating laboratories by identifying problems with particular types of samples, with particular tests, or with interpretation of results.

TABLE 5. Distribution and interpretation of HIV-specific protein band patterns on Western blot* (WB) — College of American Pathologists Proficiency Testing, 1987

HIV-Specific Bands†	WB as Interpreted by Referee and Participant Laboratories					
	Positive		Indeterminate		Negative	
	No.	(%)	No.	(%)	No.	(%)
None	0	(0.0)	9	(7.1)	118	(92.9)
Single Band	18	(60.0)	9	(30.0)	3	(10.0)
gag	6	(42.9)	7	(50.0)	1	(7.1)
pol	0	(0.0)	2	(100.0)	0	(0.0)
env	12	(85.7)	0	(0.0)	2	(14.3)
Multiple Bands	208	(96.7)	4	(1.9)	3	(1.4)
gag, pol	8	(80.0)	1	(10.0)	1	(10.0)
gag, env	125	(98.4)	0	(0.0)	2	(1.6)
pol, env	2	(40.0)	3	(60.0)	0	(0.0)
gag, pol, env	73	(100.0)	0	(0.0)	0	(0.0)
Total	**226**	**(60.8)**	**22**	**(5.9)**	**124**	**(33.3)**

*Samples tested and reported include reactive samples W-21, W-23, and W-24 and nonreactive samples W-22 and W-25.

†Bands may be any proteins or glycoproteins that are products of the genes listed. HIV-specific gene products are shown in Table 1.

Serologic Testing — Continued

However, results of proficiency testing programs should be interpreted cautiously. Data from proficiency testing measure only the operational performance of participating laboratories but cannot be used to measure the sensitivity or specificity of a given test. Samples provided for testing in the HIV antibody surveys may be pooled human plasma samples with known levels of anti-HIV reactivity, or they may be dilutions of a single reactive plasma sample in HIV-negative serum. They are rarely fresh serum specimens from a person who is or is not infected with HIV. Some samples are selected because they exhibit nonspecific reactivity or are otherwise difficult to test and interpret; they are not typical of the vast majority of specimens that will be handled by the participating laboratories. For instance, in normal practice, samples W-22 and W-25 would not be tested by WB because the EIA was nonreactive. The nonspecific reactivity of the type that occurred with specimen W-22 cannot always be predicted; a similar unexplained nonspecific reaction occurred in a proficiency testing program conducted by CDC (*16*) and with several samples used by the American Association of Bioanalysts (unpublished data).

The number of specimens commonly used in proficiency testing programs (five in each CAP survey) sent to each laboratory also limits the application of survey results. This number of specimens is not sufficient to measure adequately the performance of any single laboratory. The number of specimens tested per month in different laboratories varies enormously, and no attempt is made in the survey to select a representative sample of laboratories performing the test; those that choose to participate in the survey do so voluntarily.

Laboratories in the surveys reported indeterminate WB results on some reactive and nonreactive samples. An indeterminate result is not a final result; it requires additional laboratory testing on the same specimen and often entails asking the person from whom the specimen was obtained to provide one or more additional specimens. The final interpretation of an indeterminate result frequently will also require additional epidemiologic, clinical, or corroborating laboratory information.

Even among the diverse laboratories participating in the CAP survey, none performing the EIA and WB tests in sequence would have reported false-positive test results. However, performance and interpretation of WB tests vary among laboratories. The Public Health Service is convening a meeting to address these issues. A nationwide performance evaluation program for HIV antibody testing has been started by CDC's Training and Laboratory Program Office and Center for Infectious Diseases (*17*). The first sample shipment, consisting of reference materials, was mailed in November 1987 to more than 700 participating U.S. laboratories.

The predictive values of both positive and negative test results for HIV antibody are extremely high in laboratories that have good quality control and high performance standards and that use licensed EIA tests and the licensed WB or other well-standardized tests. Physicians or other health-care providers who request HIV antibody tests and who counsel persons about test results must have a clear understanding of the significance of the test results and the potential pitfalls of the testing process. When test results are indeterminate or inconsistent with other information, additional information should be obtained to try to confirm whether the person is infected with HIV. The counseling procedure should include a careful assessment of the person's potential risks or exposures to HIV. As for all medical tests, results should be interpreted in concert with all the historic, epidemiologic, clinical, and other pertinent laboratory information available.

Serologic Testing — Continued

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TABLE I. Summary — cases of specified notifiable diseases, United States

Disease	52nd Week Ending			Cumulative, 52nd Week Ending		
	Jan. 2, 1988	Dec. 27, 1986	Median 1982-1986	Jan. 2, 1988	Dec. 27, 1986	Median 1982-1986
Acquired Immunodeficiency Syndrome (AIDS)	514	434	N	20,940	13,405	N
Aseptic meningitis	84	186	209	10,949	10,934	10,379
Encephalitis: Primary (arthropod-borne & unspec)	15	24	35	1,266	1,228	1,320
Post-infectious	3	1	3	104	104	104
Gonorrhea: Civilian	8,574	13,242	14,160	751,600	887,936	887,936
Military	124	213	322	15,887	16,969	21,107
Hepatitis: Type A	447	439	654	24,491	23,043	23,043
Type B	375	523	755	25,170	25,842	25,842
Non A, Non B	41	67	N	2,882	3,494	N
Unspecified	42	82	149	3,067	4,368	5,755
Legionellosis	12	21	N	863	832	N
Leprosy	3	2	8	206	262	251
Malaria	12	19	26	882	1,103	1,034
Measles: Total*	2	20	47	3,588	6,235	2,579
Indigenous	2	20	N	3,166	5,925	N
Imported	-	-	N	422	310	N
Meningococcal infections: Total	52	59	75	2,857	2,491	2,689
Civilian	52	58	75	2,856	2,488	2,685
Military	-	1	-	1	3	7
Mumps	35	312	84	12,299	6,011	3,348
Pertussis	65	22	101	2,529	4,053	2,460
Rubella (German measles)	-	15	12	329	530	740
Syphilis (Primary & Secondary): Civilian	480	455	459	35,398	27,273	27,947
Military	8	1	7	168	164	288
Toxic Shock syndrome	3	6	N	325	358	N
Tuberculosis	532	587	746	21,668	22,212	22,212
Tularemia	2	-	4	188	168	271
Typhoid Fever	5	12	22	347	332	403
Typhus fever, tick-borne (RMSF)	2	1	11	592	744	833
Rabies, animal	43	60	100	4,507	5,318	5,394

TABLE II. Notifiable diseases of low frequency, United States

	Cum. 1987		Cum. 1987
Anthrax	1	Leptospirosis (Hawaii 13)	50
Botulism: Foodborne (Fla. 1)	15	Plague	11
Infant	48	Poliomyelitis, Paralytic	-
Other (Ore. 1)	3	Psittacosis (Ore. 1, Ga. 1, Minn. 1, Iowa 3)	86
Brucellosis (Tex. 1)	116	Rabies, human	-
Cholera	5	Tetanus (Kan. 1)	40
Congenital rubella syndrome	5	Trichinosis	37
Congenital syphilis, ages < 1 year	339	Typhus fever, flea-borne (endemic, murine)	37
Diphtheria	3		

*There were no cases of internationally imported measles reported for this week.

TABLE III. Cases of specified notifiable diseases, United States, weeks ending January 2, 1988 and December 27, 1986 (52nd Week)

Reporting Area	AIDS	Aseptic Meningitis	Encephalitis		Gonorrhea (Civilian)		Hepatitis (Viral), by type				Legionellosis	Leprosy
			Primary	Post-infectious			A	B	NA,NB	Unspecified		
	Cum. 1987	1987	Cum. 1987	Cum. 1987	Cum. 1987	Cum. 1986	1987	1987	1987	1987	1987	Cum. 1987
UNITED STATES	20,940	84	1,266	104	751,600	887,936	447	375	41	42	12	206
NEW ENGLAND	832	6	45	2	23,543	21,998	13	20	-	4	1	20
Maine	28	-	4	-	690	647	-	1	-	-	-	-
N.H.	33	-	2	-	400	584	2	1	-	-	-	2
Vt.	15	-	6	-	219	265	1	2	-	-	-	-
Mass.	457	1	17	1	8,228	8,656	8	16	-	4	1	16
R.I.	98	1	3	1	2,118	1,886	-	-	-	-	-	-
Conn.	231	4	13	-	11,888	9,760	2	-	-	-	-	2
MID. ATLANTIC	6,132	3	145	11	117,237	156,947	11	39	1	4	-	22
Upstate N.Y.	672	2	54	3	17,361	16,976	11	9	1	-	-	-
N.Y. City	3,291	1	16	3	61,750	90,902	-	30	-	4	-	21
N.J.	1,517	-	11	-	16,836	20,287	-	-	-	-	-	-
Pa.	652	-	64	5	21,290	26,780	-	-	-	-	-	1
E.N. CENTRAL	1,378	8	365	13	115,190	118,880	17	25	6	1	3	8
Ohio	313	2	162	6	28,460	29,992	8	2	5	-	-	3
Ind.	125	6	54	-	9,168	12,131	1	4	-	1	-	-
Ill.	631	-	26	7	32,578	26,238	-	-	-	-	-	1
Mich.	213	-	82	-	37,381	37,919	8	19	1	-	3	3
Wis.	96	-	41	-	9,593	12,350	-	-	-	-	-	1
W.N. CENTRAL	465	1	91	-	30,680	37,790	28	8	-	1	2	-
Minn.	130	-	54	-	4,468	5,431	-	-	-	-	-	-
Iowa	27	-	16	-	2,990	3,866	2	4	-	-	-	-
Mo.	233	1	1	-	16,332	18,665	1	1	-	-	-	-
N. Dak.	2	-	1	-	276	304	-	-	-	-	-	-
S. Dak.	2	-	-	-	622	774	-	-	-	-	1	-
Nebr.	23	-	10	-	2,025	2,797	1	2	-	-	1	-
Kans.	48	-	9	-	3,967	5,953	24	1	-	1	-	-
S. ATLANTIC	3,580	23	171	38	197,651	228,996	32	91	3	3	4	5
Del.	36	-	7	1	3,374	3,738	-	-	-	-	-	-
Md.	459	1	21	8	22,758	27,095	4	9	-	-	-	2
D.C.	466	-	-	-	13,228	16,958	-	4	-	-	-	-
Va.	231	1	40	2	14,353	18,742	8	3	-	-	-	-
W. Va.	21	-	57	-	1,446	2,187	-	1	-	-	-	-
N.C.	202	8	28	-	30,003	35,670	7	18	1	-	1	-
S.C.	78	-	1	-	14,192	19,054	1	7	-	-	-	1
Ga.	500	5	1	-	36,354	38,212	2	8	1	-	3	-
Fla.	1,587	8	16	27	62,943	67,340	10	43	1	3	-	2
E.S. CENTRAL	322	10	64	8	58,282	70,355	15	16	1	-	2	-
Ky.	47	-	31	1	5,679	7,743	12	7	-	-	1	-
Tenn.	72	5	15	-	19,981	26,517	1	2	-	-	-	-
Ala.	153	5	18	1	17,276	20,788	-	4	1	-	1	-
Miss.	50	-	-	6	13,346	15,309	2	3	-	-	-	-
W.S. CENTRAL	2,167	21	158	4	84,473	101,771	71	63	13	13	-	4
Ark.	47	-	3	2	9,432	9,592	8	8	1	-	-	-
La.	334	7	30	-	14,196	17,217	3	14	5	-	-	-
Okla.	108	-	28	1	9,173	11,681	8	2	3	1	-	-
Tex.	1,680	14	97	1	51,672	63,281	52	39	4	12	-	4
MOUNTAIN	641	1	74	4	19,400	25,595	31	19	2	4	-	2
Mont.	7	-	1	-	598	669	-	6	1	1	-	-
Idaho	10	-	-	-	655	872	-	-	-	-	-	1
Wyo.	3	-	1	-	421	535	-	-	-	1	-	-
Colo.	227	-	42	-	4,474	6,599	1	5	1	-	-	-
N. Mex.	48	1	5	-	2,106	2,755	21	4	-	-	-	-
Ariz.	218	-	19	1	6,498	8,219	-	-	-	-	-	-
Utah	39	-	1	3	668	1,115	6	2	-	2	-	-
Nev.	89	-	5	-	4,014	4,831	3	2	-	-	-	1
PACIFIC	5,423	11	153	24	107,154	125,604	229	94	15	12	-	145
Wash.	343	-	12	4	8,756	9,064	145	45	6	3	-	6
Oreg.	160	-	-	-	3,962	5,387	24	15	1	1	-	1
Calif.	4,825	10	134	20	91,929	107,474	56	32	8	8	-	112
Alaska	14	1	3	-	1,699	2,636	4	2	-	-	-	-
Hawaii	81	-	4	-	809	1,293	-	-	-	-	-	26
Guam	3	-	-	-	180	225	-	-	-	-	-	-
P.R.	200	-	1	1	1,897	2,395	-	-	-	4	-	5
V.I.	-	-	-	-	276	268	-	-	-	-	-	-
Pac. Trust Terr.	-	-	-	-	355	483	-	-	-	-	-	48
Amer. Samoa	-	-	-	-	76	59	-	-	-	-	-	1

N: Not notifiable U: Unavailable

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending January 2, 1988 and December27, 1986 (52nd Week)

Reporting Area	Malaria	Measles (Rubeola)					Meningococcal Infections	Mumps		Pertussis			Rubella		
		Indigenous		Imported*		Total									
	Cum. 1987	1987	Cum. 1987	1987	Cum. 1987	Cum. 1986	Cum. 1987	1987	Cum. 1987	1987	Cum. 1987	Cum. 1986	1987	Cum. 1987	Cum. 1986
UNITED STATES	882	2	3,166	-	422	6,235	2,857	35	12,299	65	2,529	4,053	-	329	530
NEW ENGLAND	56	-	119	-	183	103	232	1	61	1	186	183	-	2	9
Maine	2	-	3	-	-	13	14	-	1	-	34	2	-	1	-
N.H.	3	-	61	-	102	43	23	1	12	1	57	85	-	-	1
Vt.	-	-	11	-	15	-	18	-	7	-	4	3	-	-	1
Mass.	23	-	27	-	39	36	114	-	23	-	55	60	-	1	4
R.I.	8	-	1	-	1	2	14	-	2	-	5	7	-	-	2
Conn.	20	-	16	-	6	9	49	-	16	-	31	26	-	-	1
MID. ATLANTIC	116	-	532	-	57	1,977	372	7	300	3	311	224	-	12	37
Upstate N.Y.	35	-	29	-	14	101	131	2	128	2	171	143	-	10	27
N.Y. City	25	-	448	-	19	937	38	-	16	-	19	10	-	1	5
N.J.	29	-	[U]	-	7	911	73	-	76	-	25	20	-	1	5
Pa.	27	-	25	-	17	28	130	5	80	1	96	51	-	-	-
E.N. CENTRAL	52	-	305	-	25	1,126	431	5	6,548	36	298	398	-	38	87
Ohio	14	-	1	-	4	10	144	4	143	35	123	169	-	-	1
Ind.	7	-	-	-	-	36	46	-	962	-	23	36	-	-	-
Ill.	7	-	192	-	18	684	102	-	2,647	-	18	41	-	27	70
Mich.	18	-	29	-	-	107	111	1	1,108	1	54	36	-	9	16
Wis.	6	-	143	-	3	287	28	-	1,688	-	80	113	-	2	1
W.N. CENTRAL	28	-	208	-	22	341	117	6	1,452	7	184	1,349	-	2	14
Minn.	8	-	19	-	20	50	33	-	782	-	14	49	-	-	1
Iowa	6	-	-	-	-	134	5	5	467	-	58	19	-	1	1
Mo.	8	-	188	-	1	32	35	-	38	6	46	24	-	-	1
N. Dak.	-	-	1	-	-	25	1	-	6	-	15	6	-	-	1
S. Dak.	-	-	-	-	-	-	4	-	80	1	4	14	-	-	-
Nebr.	5	-	-	-	-	1	7	1	6	-	1	10	-	-	-
Kans.	1	-	-	-	1	99	32	-	63	-	16	1,227	-	1	10
S. ATLANTIC	148	-	166	-	13	892	471	-	332	9	330	787	-	18	12
Del.	3	-	32	-	-	1	7	-	-	-	5	227	-	2	-
Md.	35	-	9	-	2	35	50	-	45	-	23	188	-	3	1
D.C.	21	-	-	-	1	2	12	-	1	-	-	-	-	1	-
Va.	26	-	1	-	-	60	71	-	88	1	56	56	-	1	-
W. Va.	2	-	-	-	-	2	6	-	41	-	50	26	-	-	-
N.C.	13	-	2	-	4	4	55	-	31	-	123	88	-	1	-
S.C.	6	-	2	-	-	301	43	-	21	6	8	18	-	-	-
Ga.	7	-	9	-	1	93	92	-	40	-	23	135	-	2	-
Fla.	35	-	110	-	5	394	135	-	65	-	42	71	-	8	11
E.S. CENTRAL	15	-	5	-	3	70	157	2	1,515	1	48	49	-	3	4
Ky.	3	-	-	-	-	6	29	-	273	-	2	5	-	2	4
Tenn.	1	-	-	-	-	58	73	1	1,178	-	15	18	-	1	-
Ala.	5	-	1	-	3	2	45	1	64	1	25	25	-	-	-
Miss.	6	-	4	-	-	6	10	N	N	-	6	1	-	-	-
W.S. CENTRAL	57	-	444	-	4	723	203	5	1,343	-	312	254	-	12	73
Ark.	1	-	-	-	-	283	22	-	294	-	13	20	-	2	1
La.	1	-	-	-	-	4	26	-	707	-	50	16	-	-	-
Okla.	5	-	3	-	1	39	35	1	19	-	171	129	-	6	-
Tex.	50	-	441	-	3	397	120	4	323	-	78	89	-	4	72
MOUNTAIN	42	-	478	-	19	330	82	1	280	-	222	282	-	28	24
Mont.	-	-	127	-	1	8	4	-	9	-	7	20	-	8	2
Idaho	3	-	-	-	-	1	6	-	7	-	78	51	-	1	-
Wyo.	2	-	-	-	2	-	-	-	-	-	5	4	-	1	1
Colo.	13	-	5	-	4	10	34	1	35	-	70	66	-	-	1
N. Mex.	2	-	309	-	9	39	7	N	N	-	12	29	-	-	-
Ariz.	18	-	35	-	1	258	27	-	191	-	38	65	-	5	2
Utah	1	-	-	-	1	13	10	-	12	-	12	43	-	11	15
Nev.	3	-	2	-	1	2	4	-	6	-	-	4	-	-	3
PACIFIC	368	2	860	-	116	673	782	8	488	8	668	527	-	216	270
Wash.	28	-	34	-	13	176	85	2	71	6	106	161	-	2	17
Oreg.	6	-	22	-	81	13	37	N	N	-	84	16	-	2	4
Calif.	327	2	794	-	17	455	640	5	393	2	236	312	-	140	242
Alaska	3	-	-	-	1	-	10	1	8	-	5	5	-	2	-
Hawaii	4	-	-	-	4	29	10	-	16	-	238	36	-	70	7
Guam	-	-	2	-	-	5	5	-	5	-	-	-	-	1	4
P.R.	1	-	771	-	-	44	5	-	13	-	20	19	1	4	62
V.I.	-	-	-	-	-	-	-	-	21	-	-	-	-	1	2
Pac. Trust Terr.	-	-	1	-	-	-	1	-	5	-	1	-	-	1	4
Amer. Samoa	-	-	2	-	-	2	-	-	7	-	-	-	-	-	1

*For measles only, imported cases includes both out-of-state and international importations.
N: Not notifiable U: Unavailable †International §Out-of-state

TABLE III. (Cont'd.) Cases of specified notifiable diseases, United States, weeks ending January 2, 1988 and December 27, 1986 (52nd Week)

Reporting Area	Syphilis (Civilian) (Primary & Secondary)		Toxic-shock Syndrome	Tuberculosis		Tula-remia	Typhoid Fever	Typhus Fever (Tick-borne) (RMSF)	Rabies, Animal
	Cum. 1987	Cum. 1986	1987	Cum. 1987	Cum. 1986	Cum. 1987	Cum. 1987	Cum. 1987	Cum. 1987
UNITED STATES	35,398	27,273	3	21,668	22,212	188	347	592	4,507
NEW ENGLAND	658	485	-	685	686	1	33	8	7
Maine	1	19	-	28	34	-	2	-	3
N.H.	5	13	-	18	32	-	-	-	-
Vt.	4	9	-	16	17	-	1	-	-
Mass.	312	264	-	398	379	1	19	4	-
R.I.	13	19	-	61	49	-	3	-	1
Conn.	323	161	-	164	175	-	8	4	3
MID. ATLANTIC	6,377	3,889	-	4,041	4,309	1	45	26	396
Upstate N.Y.	248	201	-	529	613	1	10	11	54
N.Y. City	4,739	2,205	-	2,001	2,271	-	14	5	-
N.J.	721	678	-	748	720	-	21	1	15
Pa.	669	805	-	765	705	-	-	9	327
E.N. CENTRAL	875	839	1	2,349	2,596	3	36	37	150
Ohio	110	125	1	437	461	1	11	21	14
Ind.	57	108	-	253	269	-	5	1	17
Ill.	437	384	-	1,040	1,144	-	12	7	45
Mich.	210	180	-	523	616	-	5	5	39
Wis.	61	42	-	96	106	2	3	3	48
W.N. CENTRAL	182	209	-	616	641	67	13	54	960
Minn.	23	33	-	122	151	-	5	-	248
Iowa	27	9	-	42	46	4	2	1	289
Mo.	81	109	-	324	318	41	5	19	58
N. Dak.	1	6	-	14	10	1	-	-	107
S. Dak.	11	9	-	29	29	9	-	1	219
Nebr.	19	12	-	25	19	4	-	3	16
Kans.	20	31	-	60	68	8	1	30	42
S. ATLANTIC	12,438	8,286	1	4,714	4,584	5	37	230	1,306
Del.	70	62	-	41	53	1	-	2	-
Md.	627	471	-	429	327	-	4	46	439
D.C.	423	294	-	156	162	-	3	-	44
Va.	321	326	-	424	416	2	10	22	382
W. Va.	13	20	-	99	125	-	1	7	79
N.C.	730	536	-	664	716	2	3	84	8
S.C.	668	696	-	469	580	-	-	36	59
Ga.	1,680	1,507	-	857	741	-	2	30	209
Fla.	7,906	4,374	1	1,576	1,454	-	14	3	106
E.S. CENTRAL	1,864	1,801	-	1,930	1,945	9	4	99	304
Ky.	32	69	-	410	438	4	2	13	135
Tenn.	730	634	-	641	599	1	1	58	81
Ala.	484	516	-	541	601	1	1	15	81
Miss.	618	582	-	338	317	3	-	12	7
W.S. CENTRAL	4,343	5,257	1	2,505	2,851	74	32	119	597
Ark.	252	256	-	319	388	40	2	12	123
La.	822	916	-	331	430	3	-	-	13
Okla.	186	153	-	237	252	28	4	88	33
Tex.	3,083	3,933	1	1,618	1,770	3	26	19	428
MOUNTAIN	719	645	-	565	563	16	16	18	367
Mont.	9	7	-	18	29	2	-	11	169
Idaho	6	16	-	26	25	1	-	-	9
Wyo.	3	4	-	-	-	-	-	1	75
Colo.	133	141	-	82	85	5	-	3	7
N. Mex.	58	74	-	98	103	1	11	-	3
Ariz.	295	288	-	279	249	3	4	-	83
Utah	27	21	-	25	31	2	-	1	7
Nev.	188	114	-	35	41	2	1	-	14
PACIFIC	7,942	5,862	-	4,263	4,037	12	131	4	421
Wash.	153	168	-	253	214	4	9	-	-
Oreg.	311	127	-	141	133	5	3	1	-
Calif.	7,456	5,531	-	3,807	3,446	2	111	3	413
Alaska	4	2	-	67	65	1	-	-	8
Hawaii	18	34	-	195	179	-	8	-	-
Guam	2	1	-	28	35	-	-	-	-
P.R.	879	871	-	303	340	-	-	-	68
V.I.	10	1	-	2	1	-	-	-	-
Pac. Trust Terr.	222	314	-	154	97	-	20	-	-
Amer. Samoa	2	1	-	4	5	-	1	-	-

U: Unavailable

TABLE IV. Deaths in 121 U.S. cities,* week ending January 2, 1988 (52nd Week)

Reporting Area	All Causes, By Age (Years)						P&I**
	All Ages	>65	45-64	25-44	1-24	<1	Total
NEW ENGLAND	657	460	110	53	16	18	56
Boston, Mass.	156	101	31	15	4	5	14
Bridgeport, Conn.	40	24	5	7	-	4	4
Cambridge, Mass.§	26	22	3	1	-	-	3
Fall River, Mass.	29	22	6	1	-	-	1
Hartford, Conn.	74	46	18	3	4	3	2
Lowell, Mass.	30	19	7	4	-	-	3
Lynn, Mass.	20	15	3	1	-	1	2
New Bedford, Mass.	25	20	3	1	-	1	2
New Haven, Conn.	45	29	6	7	2	1	4
Providence, R.I.	62	46	7	6	2	1	4
Somerville, Mass.	6	5	1	-	-	-	-
Springfield, Mass.	60	45	10	3	1	1	5
Waterbury, Conn.	37	26	5	4	2	-	4
Worcester, Mass.	47	40	5	-	1	1	8
MID. ATLANTIC	2,893	1,748	559	267	57	62	127
Albany, N.Y.	36	20	11	2	1	2	-
Allentown, Pa.	18	12	4	-	2	-	-
Buffalo, N.Y.	100	72	18	6	2	2	6
Camden, N.J.	36	21	9	5	-	1	1
Elizabeth, N.J.	28	21	3	1	-	-	2
Erie, Pa.†	39	23	12	2	2	-	4
Jersey City, N.J.	69	42	13	11	1	2	3
N.Y. City, N.Y.§	1,520	969	309	174	33	35	58
Newark, N.J.	88	38	29	24	4	3	6
Paterson, N.J.	25	14	7	3	-	1	-
Philadelphia, Pa.	294	204	64	15	5	6	17
Pittsburgh, Pa.†	79	57	16	3	-	2	1
Reading, Pa.	36	27	7	1	1	-	3
Rochester, N.Y.	112	83	17	7	2	3	8
Schenectady, N.Y.	28	23	4	1	-	-	1
Scranton, Pa.†	18	10	5	-	1	-	-
Syracuse, N.Y.	76	48	21	3	1	3	8
Trenton, N.J.	37	25	4	7	-	1	2
Utica, N.Y.	20	18	1	-	1	-	3
Yonkers, N.Y.	30	21	5	2	1	1	3
E.N. CENTRAL	2,228	1,492	469	139	56	72	74
Akron, Ohio	51	38	8	4	-	1	-
Canton, Ohio	19	14	4	-	-	1	2
Chicago, Ill.§	564	362	125	45	10	22	16
Cincinnati, Ohio	129	91	26	4	6	2	8
Cleveland, Ohio	137	88	33	8	1	7	1
Columbus, Ohio§	142	94	28	12	4	4	3
Dayton, Ohio	111	72	34	4	1	-	2
Detroit, Mich.	243	142	51	25	15	10	4
Evansville, Ind.	34	25	6	2	-	1	-
Fort Wayne, Ind.	56	45	9	2	-	-	3
Gary, Ind.	15	9	3	3	1	-	-
Grand Rapids, Mich.	61	43	12	3	-	3	6
Indianapolis, Ind.	154	104	31	10	7	2	6
Madison, Wis.§	38	28	7	2	1	-	2
Milwaukee, Wis.	128	90	23	4	3	8	2
Peoria, Ill.	38	30	7	-	1	-	5
Rockford, Ill.	57	39	10	1	2	5	5
South Bend, Ind.	49	37	9	-	1	2	2
Toledo, Ohio	100	69	21	6	2	3	5
Youngstown, Ohio	102	73	22	5	1	1	2
W.N. CENTRAL	704	503	138	28	13	22	31
Des Moines, Iowa	60	40	11	4	1	4	4
Duluth, Minn.	34	26	7	-	-	1	-
Kansas City, Kans.	40	26	8	1	2	3	-
Kansas City, Mo.	134	90	35	5	3	1	4
Lincoln, Nebr.	36	30	4	-	-	2	1
Minneapolis, Minn.	89	52	12	3	1	1	7
Omaha, Nebr.	55	47	4	2	2	-	7
St. Louis, Mo.	153	102	35	9	2	5	4
St. Paul, Minn.	66	49	12	2	1	2	2
Wichita, Kans.	57	41	10	2	1	3	2
S. ATLANTIC	1,331	867	258	115	48	42	48
Atlanta, Ga.	163	95	42	15	5	6	4
Baltimore, Md.	284	183	56	26	11	8	5
Charlotte, N.C.§	74	51	15	4	2	2	4
Jacksonville, Fla.	140	102	22	9	6	1	6
Miami, Fla.	129	78	18	15	7	2	1
Norfolk, Va.	49	31	8	2	4	4	1
Richmond, Va.	77	56	15	3	1	2	4
Savannah, Ga.	42	31	6	4	1	-	4
St. Petersburg, Fla.	105	87	8	4	2	4	4
Tampa, Fla.	56	38	14	3	1	1	1
Washington, D.C.	202	100	52	30	8	12	8
Wilmington, Del.	19	17	2	-	-	-	-
E.S. CENTRAL	632	414	144	42	13	19	44
Birmingham, Ala.	108	67	25	5	2	7	6
Chattanooga, Tenn.	61	38	18	4	1	-	4
Knoxville, Tenn.	55	31	14	4	3	3	2
Louisville, Ky.	70	53	9	6	2	-	3
Memphis, Tenn.	182	109	40	9	4	-	13
Mobile, Ala.	49	33	8	4	-	4	5
Montgomery, Ala.	35	24	6	3	1	1	4
Nashville, Tenn.	94	59	24	7	-	4	5
W.S. CENTRAL	1,170	738	260	92	46	34	62
Austin, Tex.	42	34	5	3	-	-	5
Baton Rouge, La.	38	25	12	1	-	-	3
Corpus Christi, Tex.	25	18	7	-	-	-	1
Dallas, Tex.	172	107	31	18	12	4	9
El Paso, Tex.	61	46	8	6	-	1	3
Fort Worth, Tex.	69	46	17	1	3	2	3
Houston, Tex.§	308	176	74	34	13	11	11
Little Rock, Ark.	41	28	9	1	2	1	3
New Orleans, La.	77	49	20	5	3	-	3
San Antonio, Tex.§	184	121	40	14	4	5	14
Shreveport, La.	73	40	19	5	2	7	3
Tulsa, Okla.	80	48	18	4	7	3	3
MOUNTAIN	610	391	133	43	24	19	34
Albuquerque, N. Mex.	76	42	15	8	6	5	1
Colo. Springs, Colo.	50	35	12	1	1	1	2
Denver, Colo.	109	73	20	9	4	3	3
Las Vegas, Nev.	102	60	28	10	3	3	3
Ogden, Utah	18	14	4	-	-	-	-
Phoenix, Ariz.	78	42	24	3	6	3	6
Pueblo, Colo.	23	18	2	2	1	-	2
Salt Lake City, Utah	46	28	9	3	2	3	3
Tucson, Ariz.	109	79	21	7	1	1	4
PACIFIC	1,910	1,317	360	119	47	57	123
Berkeley, Calif.	22	20	1	1	-	-	-
Fresno, Calif.	114	79	21	4	3	7	1
Glendale, Calif.	15	14	-	1	-	-	-
Honolulu, Hawaii	56	40	12	2	2	-	1
Long Beach, Calif.	126	91	17	9	3	6	1
Los Angeles Calif.	511	353	98	32	13	7	2
Oakland, Calif.§	73	54	14	4	-	1	-
Pasadena, Calif.	26	22	2	2	-	-	-
Portland, Oreg.	107	73	18	8	3	5	-
Sacramento, Calif.	147	97	37	7	2	4	-
San Diego, Calif.	147	97	22	12	7	7	1
San Francisco, Calif.	153	94	35	16	5	3	-
San Jose, Calif.	189	128	35	10	5	11	1
Seattle, Wash.	136	92	29	7	4	4	-
Spokane, Wash.	46	32	10	2	-	1	-
Tacoma, Wash.	43	31	9	2	-	1	-
TOTAL	11,935††	7,930	2,431	898	320	345	60

*Mortality data in this table are voluntarily reported from 121 cities in the United states, most of which have populations of 100,000 more. A death is reported by the place of its occurrence and by the week that the death certificate was filed. Fetal deaths are n included.

**Pneumonia and influenza.

†Because of changes in reporting methods in these 3 Pennsylvania cities, these numbers are partial counts for the current we Complete counts will be available in 4 to 6 weeks.

††Total includes unknown ages.

§Data not available. Figures are estimates based on average of past 4 weeks.

Serologic Testing — Continued

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Progress in Chronic Disease Prevention

Screening for Cervical and Breast Cancer — Southeastern Kentucky

Mortality rates for cervical cancer among white women in Kentucky are among the highest in the nation, and excess mortality is most pronounced in the 36-county area in the southeastern part of the state (*1,2*). As one component of a comprehensive program aimed at reducing mortality from cervical cancer, a population-based women's health survey was conducted in the 36-county area during the period May-July 1986. Interviews that included questions on the respondents' medical history, specific risk factors, and use of screening for cervical and breast cancer were conducted in person with 603 women aged 18 and older.

Respondents were selected using a four-stage random probability procedure that gave each household an approximately equal chance of being included (*3*). In households with more than one eligible respondent, a random procedure for selecting respondents was used. Interviews were completed in 85% of eligible households included in the sample. The study area is primarily rural and almost exclusively white. Fewer than 1% (three women) of those interviewed were black, and they have been excluded from this analysis.

Cancer — Continued

Ninety-seven percent of respondents reported having heard of the Papanicolaou (Pap) test.* Older women were somewhat less likely to report such knowledge: 91% of women aged 65 and older compared with 99% of women aged 18-49. Ninety-one percent of women who had heard of the Pap test reported that they had had at least one test. However, the proportion that reported ever having had a Pap test declined with increasing age, from more than 96% of women under the age of 50 to 79% of women aged 65 and older (Table 1). The age-specific proportion of women in the survey who reported having had a Pap test since 1983 (within approximately 3.5 years) fell even more sharply, from 85% of women under age 50 to slightly more than one-half of women aged 50-64 and then to 39% of women aged 65 and older.

The higher proportion of women who have had a hysterectomy among the older age group does not explain the decreased usage of the Pap test. Thirty-four percent of women aged 50 and older reported having had a hysterectomy, while 14% of women under age 50 reported such histories. However, women who had had a hysterectomy were just as likely to report having had a recent Pap test. Similarly, the lower proportion of reported screening among the older women does not reflect adherence to the recommended discontinuation of regular periodic screening when women reach their sixties (*4*). The majority of the older women in the survey who did not report having had a recent Pap test also reported irregular screening during the earlier years of their life. Twenty percent of the 87 women aged 60 and older who did not report a Pap test within 3.5 years reported having had a Pap test at least every 3 years in any earlier decade.

Finally, the lower proportion of older women who reported recent screening was not a reflection of infrequent contact with the medical care system. Seventy-seven percent of the 118 women aged 50 and older who did not report a Pap test within 3.5 years did report having made at least one visit within the previous year to a medical facility other than an emergency room for reasons other than injuries.

As part of the survey, women were also questioned about screening for breast cancer, comprising breast self-examination, physical examination of the breasts by a

*From 1980 until 1987, the American Cancer Society (ACS) recommended that all asymptomatic women aged 20 and older and those under 20 who are sexually active have a Pap test annually for two negative examinations and then at least every 3 years until the age of 65 (*4*).

TABLE 1. Number and percentage of women reporting having had a Pap test — southeastern Kentucky, 1986*

	Pap Test Reported					
	Ever		Within 3.5 Years†		Within 1.5 Years§	
Age (years)	No.	(%)	No.	(%)	No.	(%)
18-34	204	(97)	187	(89)	169	(80)
35-49	142	(96)	117	(79)	85	(57)
50-64	97	(87)	59	(53)	40	(36)
≥65	86	(79)	43	(39)	29	(27)
Total	**529**	**(91)**	**406**	**(70)**	**323**	**(56)**

*Women who had not heard of the Pap test are excluded.
†Tests were reported by calendar year. Since the survey was conducted in mid-1986, Pap tests reported since 1983 were considered to have been within approximately 3.5 years.
§Pap tests reported since 1985 were considered to have been within approximately 1.5 years.

Cancer — Continued

health professional, and mammography.† Forty-eight percent (286) of the women in the study reported examining their breasts at least once a month, a proportion that was fairly consistent across age groups. However, the proportion of women reporting a recent breast examination declined with increasing age (Table 2). Eighty percent of women aged 18-40 and 60% of women over age 40 reported having had their breasts examined by a doctor or nurse within the past 3.5 years. Forty-two percent of women over age 40 reported having had their breasts examined within the past year. For all age groups, there was a strong association between having had a recent breast examination and having had a recent Pap test.

The majority of women who did not report having had a recent breast examination did report recent contact with the medical care system. Seventy-three percent of women over age 40 who did not report a breast examination within 12 months did report having made at least one visit within that period to a medical facility other than an emergency room for reasons other than injuries.

Sixty-eight percent of the women reported that they had heard of mammography. This proportion varied with age, with women aged 35-49 being the most likely to have heard of it (85%) and women aged 65 and older being the least likely (47%) (Table 3). Nineteen percent of the women who had heard of the mammogram reported having had the test. If women who have not heard of mammography are assumed never to have had it, 13% of all women surveyed and 16% of women aged 40 and older would have had a mammogram.

Reported by: Kentucky Dept for Health Svcs; Univ of Kentucky Lucille Parker Markey Cancer Center; Univ of Kentucky Survey Research Center. Div of Chronic Disease Control, Center for Environmental Health and Injury Control, CDC.

Editorial Note: In the United States and in many other countries around the world, the mortality rate from cervical cancer has declined markedly over the past several decades. Widespread screening with the Pap test is generally considered to have contributed to this decline (*6*). Yet cervical cancer remains a significant public health problem (*7*). Certain segments of the population, including black women, women

†Since 1980, the ACS has recommended monthly breast self-examination for all adult women, breast examination by a physician every 3 years for women aged 20-40 and annually for women over age 40, a baseline mammogram for women between the ages of 35 and 40, and annual mammography for women aged 50 and older (*4*). In 1983, the recommendations were modified to include mammography every 1 to 2 years for women aged 40-49 (*5*).

TABLE 2. Number and percentage of women reporting breast examination by a health professional — southeastern Kentucky, 1986

	Breast Examination Reported			
	Within 3.5 Years*		Within 1 Year†	
Age (years)	No.	(%)	No.	(%)
18-34	175	(82)	135	(63)
35-49	113	(75)	77	(51)
50-64	66	(57)	49	(42)
≥65	62	(52)	44	(37)
Total	**416**	**(69)**	**305**	**(51)**

*In the survey, examinations reported since 1983 were considered to be within approximately 3.5 years.
†Within 12 months of interview.

Cancer — Continued

with lower income and lower educational attainment, and women living in certain geographic areas (such as the women in this study) are at increased risk (*8*).

During the 1970s, Kentucky had the second highest average annual mortality rate for cervical cancer among white women. It was exceeded by neighboring West Virginia (*1*). While Kentucky's mortality rate has declined over the past 3 decades, evidence indicates that it has fallen more slowly than the national rates (*2*).

High mortality from cervical cancer can be the result of a high incidence of precursor lesions, detection of disease at later stages, inadequate follow-up and treatment, or a combination of these factors. The Kentucky Department for Health Services, in collaboration with the University of Kentucky Lucille Parker Markey Cancer Center, is currently examining the impact of these factors on the high mortality rate in southeastern Kentucky and will use this information to design and implement programs to reduce the problem. A population-based registry has been developed to identify all cases of cervical dysplasia and neoplasia occurring in the study area. This registry, which includes all newly diagnosed cases of cervical dysplasia, carcinoma *in situ* of the cervix, and invasive cancer of the cervix that have been histologically confirmed among women residing in the 36-county area, will allow calculation of incidence rates and will provide a basis for investigating risk factors.

The survey reported here indicates underusage of screening tests for cervical and breast cancer, except for Pap tests among younger women. This finding is consistent with data from national and other local surveys (*9,10*). In the 1973 National Center for Health Statistics' National Health Interview Survey (NHIS), 75% of women aged 17 and older reported having had at least one Pap test (*11*). Since then, the percentage of women who have reported being screened has increased, especially for black women. In the 1985 NHIS, 93% of women aged 18 and older reported having been screened, and 73% reported having been screened within less than 3 years. However, fewer older women reported being screened; 15% of women aged 65 and older reported never having had a Pap test, and an additional 35% of this group had not had one within less than 3 years (*12*).

While mortality from cervical cancer has declined, the age-adjusted mortality rate from breast cancer in the United States has not changed significantly in the past 10 years. Breast cancer was only recently surpassed by lung cancer as the leading cause of mortality due to cancer among females. Although mammography and physical examination by a health professional have been established as effective screening

TABLE 3. Number and percentage of women reporting knowledge and use of mammography — southeastern Kentucky, 1986

	Ever Heard of Mammogram		Ever Had Mammogram*	
Age (years)	No.	(%)	No.	(%)
18-34	142	(66)	17	(8)
35-49	127	(85)	34	(23)
50-64	85	(73)	17	(15)
≥65	56	(47)	11	(9)
Total	**410**	**(68)**	**79**	**(13)**

*Assumes women who had not heard of the mammogram had never had one.

Cancer — Continued

methods in reducing mortality due to breast cancer, their use has not yet become widespread (*6*).

Most surveys suggest that about 15% to 20% of women aged 50 and older have ever had a mammogram and that a much smaller proportion are being examined regularly. These estimates, as well as those from the Kentucky survey, undoubtedly include those mammograms that are obtained for diagnostic rather than screening purposes and, thus, overestimate screening activity (*13*). In the 1985 NHIS, 50% of women reported having had a breast examination by a health professional within less than 1 year, and the proportion reporting recent breast examinations decreased with increasing age. One in three women reported examining their breasts more than six times a year (*12*).

The low level of screening for both breast and cervical cancer among older women is of great concern because of their high risk for these diseases (*14*). Special efforts should be directed at these women to ensure their participation in screening. Both the Kentucky study and others indicate that many of the women who are not being screened are receiving medical care (*10*). Medical visits for nonacute conditions should be viewed as opportunities to inquire about screening histories and to encourage screening for breast and cervical cancer.

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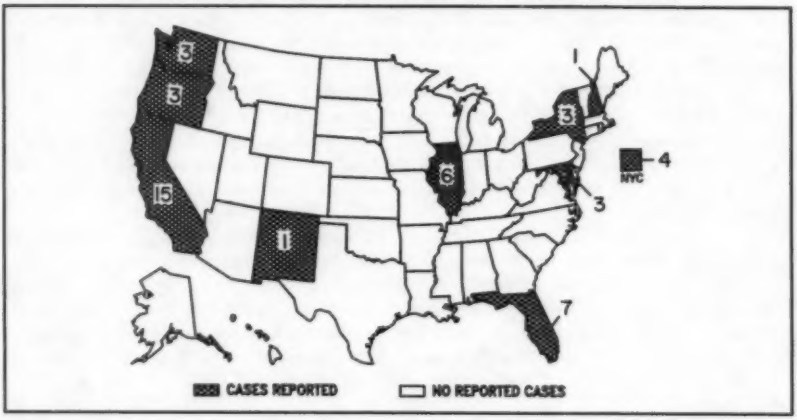
FIGURE 1. Reported measles cases — United States, Weeks 48-51, 1987



WE'VE CHANGED

Effective December 14, 1987, CDC/ATSDR changed telephone numbers as follows:

Current Numbers	New Numbers
320, 321, 329-XXXX	639-XXXX
262 or 264-XXXX	842-XXXX
452-XXXX	488-XXXX
454-4300 thru 454-4799	488-XXXX
728-XXXX or 454-0700 thru 454-0899	Total Change
All FTS Prefixes (236)	Unchanged

Recorded Messages Will Provide New Numbers

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